SYSTEM AND METHOD FOR FAILSOFT HEADEND OPERATION

CROSS-REFERENCE TO RELATED APPLICATIONS

This application claims the benefit of U.S. provisional application Serial No. 60/540,161, filed on January 29, 2004, the disclosure of which is hereby incorporated by reference. This application claims the benefit of U.S. provisional application Serial No. 60/598,241, filed on August 3, 2004, the disclosure of which is hereby incorporated by reference.

BACKGROUND OF THE INVENTION

1. Field of the Invention

The invention relates to operating a consumer network, and to operating a next generation cable network.

2. Background Art

In today's cable systems, information technology (IT) generally only plays a role during the initial provisioning and addressing of information to the subscriber. In the next generation cable system, the level of IT support needed to support video on demand (VOD), electronic content purchase, video commerce, call/session set up, and maintain security will be very different from today's IT needs.

In the next generation cable system, there will be a more intensive and regular need for IT interaction for all but the most simple one-way broadcast video services.

For the foregoing reasons, there is a need for improved IT support for a next generation cable network.

SUMMARY OF THE INVENTION

It is an object of the invention to provide an improved system and method for operating a consumer network such as a next generation cable network that provides IT support for failsoft headend operation.

The invention involves, in one aspect, a structure in which the information technology (IT) functions needed to support operations of a next generation cable network can continue to operate with minimal degraded service noticed by the customers in the event that communications between the head end IT and back office IT systems are disabled.

At a more detailed level, the invention comprehends a distributed IT architecture for use in a cable network. The IT infrastructure is divided between a centralized master database and distributed IT infrastructure. The centralized master database is in communication with the distributed IT infrastructure, which is located at multiple remote headends of cable systems in diverse locations.

The local IT infrastructure at a headend is provisioned and updated while communications between the headend IT and back office IT are functional. When the communications are disrupted or delayed, the local headend IT infrastructure provides for real-time IT support for the cable system.

In another aspect, the invention may be implemented in other consumer networks besides a cable network. In such an implementation, a distributed IT architecture is employed where the IT infrastructure is divided between a centralized master database and distributed IT infrastructure. The centralized database is in communication with the distributed IT infrastructure, which is located at multiple remote headends of consumer networks in diverse locations.

BRIEF DESCRIPTION OF THE DRAWINGS

FIGURE 1 illustrates a distributed IT architecture for failsoft operation in accordance with a preferred embodiment of the invention;

FIGURE 2 is a block diagram illustrating a method for failsoft operation in accordance with a preferred embodiment of the invention; and

FIGURE 3 is an exemplary configuration of a cable network employing distributed IT architecture for failsoft headend operation in accordance with the invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

In Figure 1, a distributed IT architecture for failsoft headend operation in a next generation cable network is generally indicated at 10. As shown, architecture 10 includes back office IT infrastructure including, for billing and auditing purposes, master records and customer/service databases. The master database is indicated at 12, and the mirror master backup database is indicated at 14. The actual service delivery infrastructure is widely distributed in multiple geographic locations distant from the master copies of the databases.

As shown, for each remote headend, architecture 10 includes headend IT infrastructure, generally indicated at 16. For each headend in the overall cable network, headend IT infrastructure 16 includes customer care support 30, cross service security manager 32, cross service spectrum manager 34, video service support 36, voice service support 38, data service support 40, and billing record collector 42. The billing record collector 42 could be, for example, a video conditional access system which collects impulse pay-per-view (PPV) events for upload to the billing system in the back office, or a voice softswitch which collects call detail records (CDRs) for upload to the billing system in the back office. Other

billing engine data such as customer entitlements are managed by video service support 36, voice service support 38, or data service support 40 in the headend.

Communication between the back office IT infrastructure 12, 14 and remote headend IT infrastructure 16 is indicated by communication path 18. Communications can be disrupted in certain situations.

For example, network congestion could delay access or high transaction intensity may disrupt communications between back office IT infrastructure 12, 14 and headend IT infrastructure 16. Further, for example, there could be a loss of network connectivity between back office IT infrastructure 12, 14 and headend IT infrastructure 16. In accordance with the invention, the distributed IT system is implemented such that basic operation can continue with minimal degraded service noticed by the customers in the event that communications along path 18 are delayed or disrupted.

With continuing reference to Figure 1, the IT infrastructure is divided between the centralized master databases 12, 14, and the distributed IT infrastructure 16 located at multiple remote headends of cable systems in diverse locations. Local IT infrastructure 16 at each headend is provisioned and updated while communications 18 between the headend IT 16 and the back office IT 12, 14 are functional. When communications are delayed or disrupted, the local headend IT 16 provides the real-time IT support for the system.

The master database 12 downloads policies to the local headend IT 16 so that transactions that normally require real-time access to master database 12 can be approved within certain preset credit or other policy limits by headend IT 16 when communication path 18 is not sufficiently functional. For example, movie purchases up to $10 might be approved even when it is not possible to check the credit limit database in centralized back office IT system 12, 14.

Although Figure 1 illustrates an embodiment of the invention providing failsoft headend operation in a next generation cable network,

embodiments of the invention may also provide a failsoft feature in other next generation complex, multiple location consumer communications and content delivery systems. Moreover, the invention comprehends distributed database and distributed IT technology employed for transaction-based systems wherein the system is partitioned by real-time versus non-real-time IT support.

Put another way, headend IT infrastructure provides real-time IT support for the system in accordance with previously determined and/or downloaded policies, while remaining IT support for the system is provided by the back office IT infrastructure. In this way, failsoft headend operation is provided in that a failure in the headend to back office communication path is a soft failure as the headend IT infrastructure is able to continue to provide real-time IT support for transactions, subject to the policy limits.

In Figure 2, a method for failsoft operation is illustrated. At block 60, for the headend IT infrastructure, policy limits are set for transactions that normally require real-time access to the central database at the central facility. At block 62, it is determined whether or not access to the central database is available.

In accordance with a preferred embodiment as depicted at block 64, when the central database is unavailable, the headend IT infrastructure operates the headend in a failsoft mode. In the failsoft mode, transactions are handled at the headend in accordance with the policy limits.

In Figure 3, an exemplary configuration of a cable network employing distributed IT architecture for failsoft headend operation is generally indicated at 80. A central facility 82 includes back office IT infrastructure 84 and central database 86. Network 80 includes multiple headends 90. Each headend 90 includes headend IT infrastructure 92. In this way, network 80 includes a distributed information technology (IT) architecture composed of back office IT infrastructure 84 and distributed headend IT infrastructure 92 at diverse locations. As shown, headends 90 each provide service to area subscribers.

It is appreciated that systems and methods for failsoft headend operation in accordance with the invention may be implemented in a variety of different configurations. In one approach, real-time transactions may be handled with headend IT infrastructure, without real-time access to the central database, subject to local policy limits. Non-real-time transactions may be handled at least partially with the back office IT infrastructure. In this same way, real-time transactions that fall outside of the local policy limits may be handled at least partially with the back office IT infrastructure. In accordance with the failsoft feature, when the central database 86 is not available, the headend IT infrastructure is able to continue to provide real-time IT support for transactions, subject to the local policy limits.

It is appreciated that the invention comprehends failsafe data flows for two distinct cases: communicating existing subscriptions/entitlements from the back office to the headend, and uploading new subscriptions/entitlements from the headend to the back office. The master information is in the back office master database, and is periodically replicated to the headend system databases.

For example, in the first case, if the headend video service support needs to know whether a customer is entitled to watch certain premium programming (broadcast delivery or on-demand), it can consult the local headend database rather than the back office master database.

For example, in the second case, suppose the customer requests (through his set-top) that he would like to subscribe to a certain premium service. That data would be recorded in the headend system database, which can be replicated to the back office master database (when network conditions permit). Note that the headend video service support would be able to offer subscription services to this customer, even before the back office master database is updated.

It is appreciated that the headend databases and master databases could be realized on different datastore technologies, for example, relational databases and LDAP / X.500 directories.

While embodiments of the invention have been illustrated and described, it is not intended that these embodiments illustrate and describe all possible forms of the invention. Rather, the words used in the specification are words of description rather than limitation, and it is understood that various changes may be made without departing from the spirit and scope of the invention.